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(21) International Application Number: PCT/GB96/01116 (22) International Filing Date: 10 May 1996 (10.05.96) (30) Priority Data: 9510234.9 20 May 1995 (20.05.95) GB (71) Applicant (for all designated States except US): ADVANCED ALLERGY TECHNOLOGIES LIMITED [GB/GB]; Royd House, 224 Hale Road, Altrincham, Cheshire WA15 8EB (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): PEARSON, David, John [GB/GB]; Royd House, 224 Hale Road, Altrincham, Cheshire WA15 8EB (GB). GOODWIN, Richard, John [GB/GB]; Hilltop, 70 Redhill Drive, Bredbury, Stockport, Cheshire SK6 2HQ (GB). (74) Agents: McNEIGHT, David, Leslie et al.; McNeight & Lawrence, Regent House, Heaton Lane, Stockport, Cheshire SK4 1BS (GB).		(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>
(54) Title: ALLERGEN PARTICLE EXCLUSION AND/OR RETENTION COVERING (57) Abstract There is disclosed an allergen particle exclusion covering comprising a permeable composite fabric of which one component is a porous fabric having electrostatic charge which traps particles in the pores.		

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ALLERGEN PARTICLE EXCLUSION
AND/OR RETENTION COVERING

This invention relates to allergen particle exclusion and/or retention coverings.

It is, of course, possible to cover items, particularly domestic items such as bedding, (mattresses, duvets, pillows etc) with allergen particle exclusion and/or retention coverings which are totally impermeable, and therefore 100% effective as a barrier to allergenic organisms and particles such as house dust mites and their faeces. However, the other properties of such totally impermeable coverings are less than satisfactory - for use as bedding, the fact that such materials cannot breathe renders them at best uncomfortable, more seriously unhealthy in that for chronically bedridden patients (where incontinence might also be a problem) they might give rise to bed-sore problems.

Materials have been prepared including microporous materials and materials such as polyurethanes which are impermeable to liquid water but which allow water to be transferred from one face to the other, which address these problems, but, though these materials are better in many respects than the totally impermeable materials, they still leave much to be desired as regards their performance as textiles. For example, materials which have pores sufficiently restricted to prevent the passage of mite Der p 1 allergen have such a high resistance to airflow as to render them capable of causing death by asphyxia - they do not achieve the minimum airflow specified in British Standard 4578, 1970.

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The present invention provides improved coverings that do not have the aforesaid disadvantages and indeed have other advantages over the prior art coverings.

The invention comprises an allergen particle exclusion and/or retention covering comprising a permeable composite fabric of which one component is a porous fabric having electrostatic charge which traps particles in the pores.

The porous fabric may have an overall electrostatic charge, and may be a fabric such as Villedon ® in which the charge is induced during manufacture of the fabric.

The porous fabric may, on the other hand, have no overall charge, and may be a blend of fibres which have opposing electrical charges, such for example as polypropylene and acrylic fibres.

The porous fabric may be laminated to a fabric having at least commensurate permeability. Since the filtering of particles is effected electrostatically, there is no demanding limitation on the permeability of the porous fabric, and fabrics having a wide range of permeabilities may be found useful for different purposes. The porous fabrics themselves might be unsuitable *per se* as regards requirements other than the filtration of allergens, and the defects can be made good by lamination to a fabric which is suitable in those other respects.

The porous fabric may be a knitted, woven or non-woven fabric, and may be laminated with another fabric on one or both faces. For some applications, the outer

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fabric face may be water proofed as by a silicon or like coating which, or some other coating, may also make the fabric soil resistant. Resistance in other regards may also be imparted, e.g. fire resistance or retardancy, mildew resistance and so on, care being taken, naturally, not to reduce the permeability of the composite, treated fabric to an extent which brings it below the minimum requirement for the prescribed end use.

The invention also comprises an article covered by a covering as described, such, for example, as an article of bedding or a child's or infant's toy - a teddy bear or doll, for instance. The article may have a separate outer cover, which may be removable, and such a removable cover may be closable by a tight seal so as to leave no path for allergenic material from inside to outside of the cover. A slide fastener, for example, may be underlain by a sealing flap.

In addition to the allergen particle exclusion and/or retention covering, there may be a separate removable covering. A soft toy, for example, may have a permanent outer covering on a basic foam, padding or like interior, the permanent outer cover being of the allergen exclusion material. This may in turn be covered by a removable outer covering which is washable and which provides the aesthetic features of the toy.

Embodiments of allergen particle exclusion and/or retention coverings and of articles comprising the same according to the invention will now be described with reference to the accompanying drawings, in which:-

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Figure 1 is a diagrammatic cross-section through one embodiment of a fabric,

Figure 2 is a diagrammatic cross-section through another embodiment of a fabric,

Figure 3 is a diagrammatic cross-section through an article such as a pillow case covered in a fabric as illustrated in Figure 1 or Figure 2,

Figure 4 is a diagrammatic cross-section through a second embodiment of a pillow case or like article,

Figure 5 is an illustration of a soft toy with a removable cover, showing the cover removed, and

Figure 6 is a diagrammatic section through a vacuum cleaner.

The drawings illustrate allergen particle exclusion and/or retention coverings comprising a permeable composite fabric of which one component 11 is a porous fabric having electrostatic charge which traps particles in the pores.

Specialist such fabrics are available such for example as "Villedon" ® manufactured by Freudenberg which has a high electrostatic charge induced during manufacture, or "Technostat" ® manufactured by Hepworth Mineral and Chemicals

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Limited in which opposed electrostatic charges are held by polypropylene and modacrylic fibres within a material of overall electrostatic neutrality.

For general textile usage, the porous fabric 11 is laminated to a fabric 12 having at least commensurate permeability. It is not essential that the fabric 12 has a greater permeability than the porous electrostatic fabric 11, but that it does not have a permeability which is so low as to detract from the overall utility of the composite. The electrostatic fabric may have a permeability much higher than is actually required for the end use of the composite, in which case the laminated fabric 12 may have a lesser permeability and indeed such a fabric with a lower permeability may be chosen by way of controlling the permeability of the composite, as indeed may the laminating method and any finishing treatments.

Generally speaking, however, the fabric 12 - which may be knitted, woven or indeed unwoven, will have textile properties which are lacking in the electrostat, such as strength, stability, texture, the ability to be patterned or coloured or to accept print, resistance to pilling, inherent flame resistance or flame retardancy and so on, or which supplement or enhance those properties to the extent they are possessed by the electrostatic fabric 11.

For many uses in household textiles, a polyester cotton fabric serves very well as a fabric to which the electrostatic fabric 11 may be laminated. The lamination may be on one face as illustrated in Figure 1 or two faces as seen in Figure 2, in which latter case the fabrics 12 on opposite faces may be different if desired.

Lamination may be by any convenient method that, naturally, does not adversely affect the permeability of the composite, by which is meant to reduce the permeability to an unacceptably low level for the end use in question. Spot bonding, in which discrete spots of adhesive join the layers is clearly, then, going to be suitable for many applications, but even quilting and stitch bonding may be found useful in some circumstances.

Finishing treatments such for example as waterproofing using e.g. a silicone spray, flame proofing or flame retardant impregnation, crease-proofing and so on may all be carried out with the same caveat namely so as not to adversely affect the permeability.

Figures 3 and 4 illustrate, merely by way of example, pillows comprising a filling 31 such as a foam or padding or down encased in a cover 31. In Figure 3, the cover 32 is of the composite material with the electrostat 11 on the inside and a polyester cotton or other conventional woven or knitted textile fabric 12 on the outside. Figure 4 illustrates a pillow which has its filling 31 encased in a conventional fabric 33 with a further case 32 like that of Figure 3 but in this case being removable for laundering by having a slide fastener 34 which is, bearing in mind the anti-allergy purpose of the cover 32, desirably of a type which makes a good seal. For seal reinforcement, a flap 35 is shown underlying the fastener 34.

It is desirable, especially for those prone to asthma and like allergy disorders, for a complete bedding system to be encased after the fashion of the pillows in Figures 3 and 4, that is to say not only the pillows but also the mattress, duvet, quilt

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and so on. And, while bedding is important to protect, it may also be desirable to protect other furnishing items, such as the upholstery of chairs, settees, cushions and so on. The composite fabric of the invention is substantially unlimited as to the choice of material that may be laminated to the electrostat, so that even heavy upholstery fabrics may be used in the composite and even non-textile fabrics such as hyde and suede can be laminated provided they have sufficient permeability as, for example, by punch-out designs to warrant such attention. It must be remembered that even where an upholstery material is essentially non-porous, so that passage across it of allergen particles is not a problem, it is usually only the visible parts of the article that are of such material, the undersides and often the backs of chairs and sofas being either open or of coarse woven fabric such as sacking - at least this material, according to the invention, can be usefully substituted by the electrostat material of the invention if it is desired to permit the inside of the piece to breath so as not to balloon when sat on.

An important area for attention is children's and particularly infants' soft toys, and Figure 5 illustrates a basic soft toy form 51 which is covered with a composite electrostat fabric 52 and a separate cover 53 of conventional washable fabric which is closed by a slide fastener 54 for removal for laundering. The form 51 could of course be made completely impermeable, but would then have a certain internal gas pressure which would detract from the "feel" of the toy. The outer cover 53 has the aesthetic features, e.g. face, paws and so on of the toy.

Whilst textile fabrics have essentially been referred to as the companion fabrics to the electrostat 12 - the embodiments described with reference to Figures 1 to

5, it is also possible to contemplate other porous materials such for example as wire or plastic mesh or gauze, and such might be useful in particular in filtration applications.

To control house dust mites special vacuum cleaners are available with microfilters to catch the very small particles that are the cause of the problem; these vacuum cleaners are usually quite efficient at catching the bulk of the offensive particles, but the more efficient they are at that, the less effective they are at the task for which they are principally used, as the fine filters used involve high power requirements and even so result in a substantial loss of suction as compared to conventional cleaners.

Figure 6 illustrates a vacuum cleaner of the usual type which has the usual motor 61 and fan 62, with a conventional dust collection bag 63 which traps the coarser dust particles as usual. In addition it has an electrostat material 11 laminated to a metal or plastic mesh or gauze 12 which catches the very small allergen particles that flow through the bag 63. The electrostat 11 and mesh or gauze 12, however, are sufficiently permeable not to give rise to any untoward loss of suction and so a conventional motor will suffice to give a performance, so far as "cleaning" power is concerned, equal to that of conventional machines. However, according to the invention, such a vacuum cleaner may be modified by removal of the conventional dust collection bag, or even perhaps not, depending on circumstances, and used as an allergen collection device in a laboratory context.

The method of filtration of allergen particles used in the cleaner of Figure 6 can thus be used in a probe arrangement testing for airborne allergen particles, which

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can be recovered from the electrostat fabric 11 for microscopic or other examination. Quantities may be measured by pre-and-post-weighing the filter:

Materials such as described for use in vacuum cleaners or probes can also, on a larger scale, be used in filtration systems for air conditioning in buildings, automobiles, aeroplanes and so on and indeed are so used. What has not before been proposed is the use as an exclusion or retention covering or filter for the purposes above described.

Many other applications and variations, all within the scope of the invention, will become apparent on the basis of the present disclosure.

CLAIMS

1. An allergen particle exclusion covering comprising a permeable composite fabric of which one component is a porous fabric having electrostatic charge which traps particles in the pores.
2. A covering according to claim 1, in which the said porous fabric has an overall electrostatic charge.
3. A covering according to claim 2, in which the said porous fabric is a fabric such as Villedon ® in which the charge is induced during manufacture of the fabric.
4. A covering according to claim 1, in which the said porous fabric is a fabric having no overall charge.
5. A covering according to claim 4, in which the said porous fabric is a blend of fibres which have opposing electrical charges.
6. A covering according to claim 5, in which the said fibres comprise polypropylene and acrylic fibres.
7. A covering according to any one of claims 1 to 6, in which the said porous fabric is laminated to a fabric having at least commensurate permeability.

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8. A covering according to any one of claims 1 to 7, in which the said porous fabric is a woven fabric.
9. A covering according to any one claims 1 to 7, in which the said porous fabric is a knitted fabric.
10. A covering according to any one of claims 1 to 9, in which the said porous fabric is laminated with another fabric on both faces.
11. A covering according to any one of claims 1 to 10, in which an outer face of the composite is waterproofed.
12. A covering according to claim 11, in which the waterproofing is effected through silicon or like coating.
13. A covering according to any one of claims 1 to 12, in which the outer face of the composite is soil resistant.
14. An article covered by a covering according to any one of claims 1 to 13.
15. An article according to claim 14, being an article of bedding.
16. An article according to claim 14, being a child's or infant's toy.

17. An article according to any one of claims 14 to 16, having a separate outer cover.
18. An article according to claim 17, in which the separate outer cover is removable.
19. An article according to claim 17 or claim 18, in which the separate outer cover is closable by a tight seal so as to leave no path for allergenic material from inside to outside of the cover.
20. An article according to claim 19, in which the said outer cover is closable by slide fastener means.
21. An article according to claim 19 or claim 20, in which a linear fastening arrangement is underlain by a sealing flap.
22. An article according to any one of claims 14 to 21, in which in addition to the allergen particle exclusion covering there is a separate removable covering.
23. A method for filtration of allergen particles or particles of like size comprising causing a flow containing such particles through a filter comprising a porous material having electrostatic charge.
24. A method according to claim 23, in which the said filter experiences flow from which coarser particles have been prefiltered.

25. A method according to claim 23 or claim 24, in which the said porous material is inherently charged.
26. A method according to claim 25, in which the inherently charged material has a net overall charge.
27. A method according to claim 25, in which the inherently charged material is comprised of fibres having opposite charges and has no net overall charge.
28. A method according to claim 23 or claim 24, in which the porous material is electrically conductive and has a temporary electric potential applied to it for filtration.
29. A vacuum cleaner or like filter arrangement comprising a filter comprising a porous material having electrostatic charge.

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FIG. 1

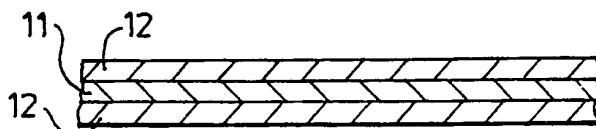


FIG. 2

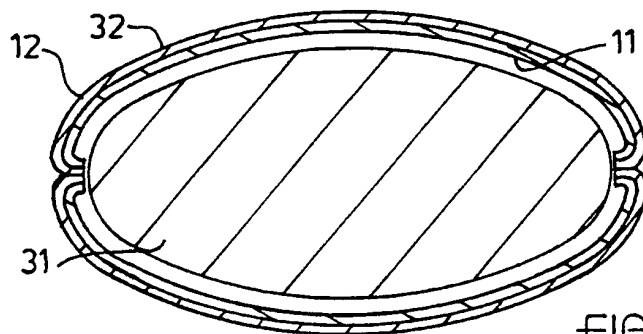


FIG. 3

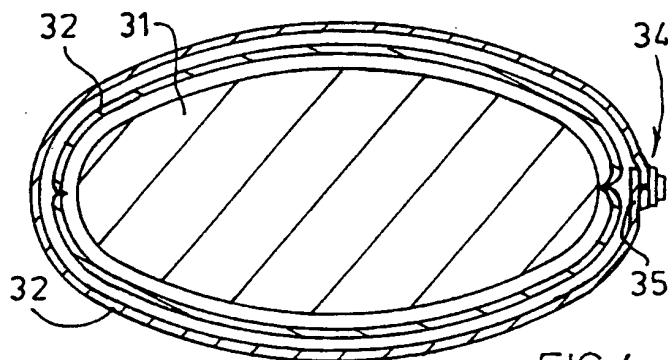


FIG. 4

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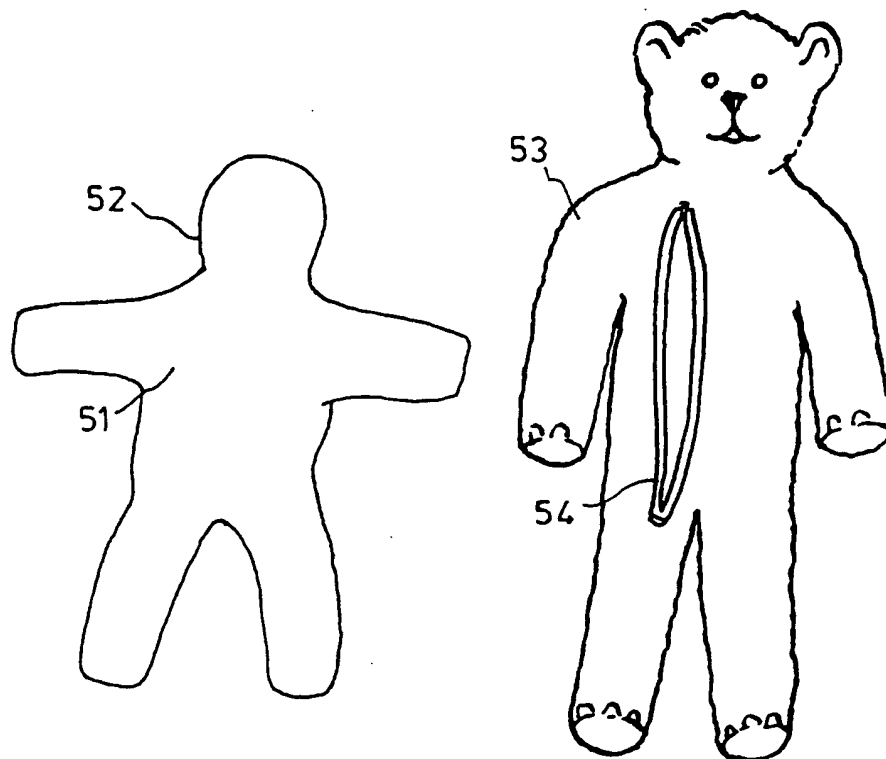


FIG. 5

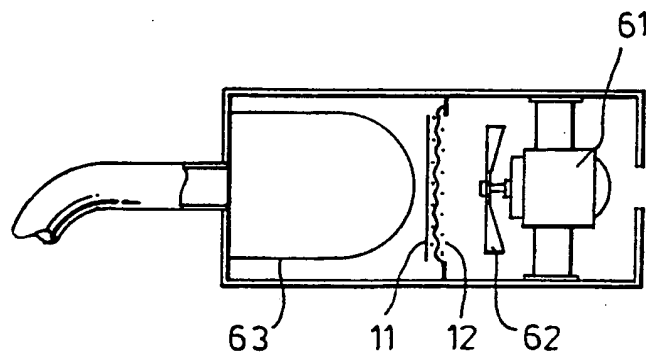


FIG. 6

INTERNATIONAL SEARCH REPORT

Intern. Application No
PCT/GB 96/01116

A. CLASSIFICATION OF SUBJECT MATTER IPC 6 B32B5/26 B03C3/28 A47L9/10 A47C31/10 A47G9/00		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 6 B32B B03C		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US,A,4 375 718 (WADSWORTH LARRY C ET AL) 8 March 1983 see column 1, line 45 - column 2, line 5 see column 3, line 5 - line 66 see column 5, line 19 - line 54 ---	1,2,7, 10,14
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "Z" document member of the same patent family		
Date of the actual completion of the international search 12 August 1996		Date of mailing of the international search report 23.08.96
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Information on patent family members

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